

APPENDIX J

PRE-CONCEPTUAL REMEDIAL DESIGN

1. INTRODUCTION

This appendix presents a pre-conceptual design for use in determining data needs and associated data quality objectives (DQOs) in the Remedial Design Workplan for the White King / Lucky Lass Mines Superfund Site. The volumes calculated as part of this design reflect the upper-bound quantities that could reasonably be expected at this stage of design. The actual remedial design, to be prepared after additional design investigations have been conducted pursuant to an approved workplan, may differ significantly in some aspects from the pre-conceptual design presented here.

2. CONSOLIDATED STOCKPILE

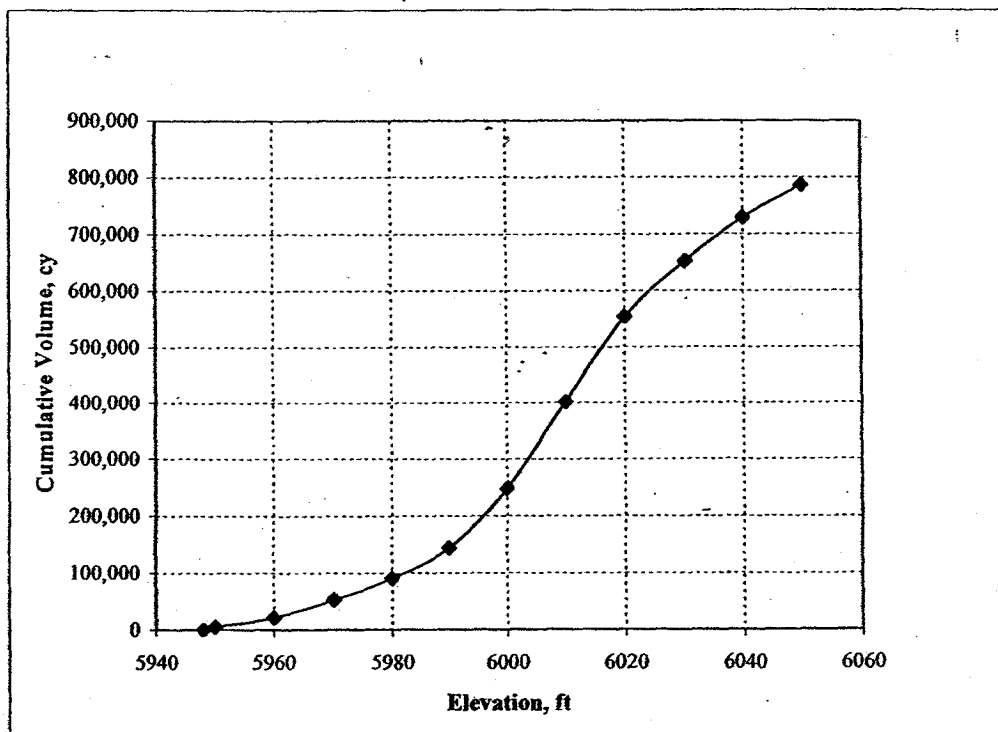
According to the ROD, soils from the Site overburden stockpile, the local haul road, and certain off-pile areas with constituents of concern (COCs) above cleanup levels are to be placed on the existing Site protore stockpile to form the consolidated stockpile. A pre-conceptual layout for the consolidated stockpile is shown on Drawing 1. The major design assumptions used for this configuration include:

- The portion of the existing protore stockpile within the 500 year floodplain (as defined in the ROD) will be removed and placed in the consolidated stockpile.
- The maximum side slopes will be 3H:1V. Naturally occurring 3H:1V soil slopes were observed during the June 18, 2003 site visit. These slopes were stable, supported stands of natural vegetation comparable to those in flatter areas, and showed no signs of erosion.
- The design includes 40-ft-wide "benches" at intervals of between 30 and 40 vertical feet to restrict the flow length on any given slope to approximately 100 feet, and thus minimize the potential for erosion. The benches also allow access for maintenance, if required. The 40-foot-width is considered the upper end of what might be necessary, and may be reduced during detailed design. The actual grades needed for drainage have not been shown on these benches, but will be established during detailed design.
- The top of the consolidated stockpile will be crowned with a slope of a few percent to provide positive drainage, although this is not shown on the drawings.
- The incremental capacity vs. elevation curve for the conceptual design is shown on Figure J-1. This figure shows that the proposed design will provide capacity for adding up to about 790,000 cubic yards (cy) of material. The currently identified requirements, based on data from the ROD and this pre-conceptual design, shown in Table J-1, are about 670,000 cy. Therefore, the proposed design has approximately 120,000 cy of contingency – about 18% of the current total estimated consolidation volume. This flexibility is considered reasonable, given the uncertainties in the extent of the cleanup that will not be known until remediation activities are performed. If the actual volume of consolidation soil is less than anticipated, the consolidated stockpile need not be constructed to the full elevation shown on Drawing 1.

Table J-1. Consolidated stockpile Required Incremental Capacity

| Source | Estimated Volume (cy) |
|------------------------------|-----------------------|
| Protore Stockpile Relocation | 131,000 |
| Overburden Stockpile* | 430,000 |
| Off-Pile Areas* | 35,000 |
| Haul Road* | 15,000 |
| Incremental Clean cover soil | 56,000 |
| Total: | 667,000 |

*volumes from ROD

**Figure J-1. Consolidated stockpile Incremental Capacity Curve**

3. TOPSOIL

The ROD specifies that topsoil should cover the surface of the consolidated stockpile, and also cover areas disturbed by remediation activities (e.g., borrow areas). Areas potentially requiring topsoil are shown on Drawing 2. Assuming that a 3-inch-thick layer of topsoil is placed in these areas, the total required volume, as specified in the ROD, is about 30,000 cy (including a 10% contingency). However, additional topsoil may not be required in areas where topsoil is already present below the material being removed, where this topsoil meets cleanup levels.

Several potential sources of topsoil have been identified, as shown on Drawing 3:

- Topsoil from the existing meadow below and adjacent to the proposed footprint of the consolidated stockpile. Based on hand-shovel excavations during the June 18, 2003, site visit, this soil is at least 2 feet thick and has a high organic content.
- Adjacent to the stockpile in the area labeled "taper zone" on Drawing 3, a layer of soil varying from 2-feet-thick at the toe of the pile to zero at about the 5949-ft contour.
- Secondary topsoil sources include the surficial layers of the borrow areas proposed for clean soil (see Drawing 3).

The total available topsoil from reasonably expected sources is therefore about 25,000 cy (slightly less than expected needs). After the required and available quantities have been more accurately determined during remedial design investigations, it is expected that small deficits of can be accommodated by amending clean soil with imported organic material.

4. CLEAN COVER SOIL

The ROD specifies that the consolidated stockpile should be covered with 2 feet of clean soil. This pre-conceptual design assumes that the upper 3 inches of this cover will consist of topsoil. The remaining 21 inches of clean cover soil over the entire consolidated stockpile area, including the northern face of the existing protore stockpile (where no incremental soil will be added), requires a volume of about 52,000 cy. Clean soil for mixing with meadow soil to produce topsoil will require about 9,000 cy. With a 10% contingency, the required volume is about 67,000 cy.

Two potential sources of clean soil have been identified, as shown on Drawing 3. The Hillside Area is located immediately to the west of the consolidated stockpile. This proposed borrow area extends to maximum elevation of 6040 ft, to avoid excessively steep slopes and reduce visibility from the Augur Creek access road. This area is generally limited to slopes of about 15% or less to facilitate earthwork operations. The second clean soil borrow area is the Clear Cut Area located about one road-mile west of consolidated stockpile.

Assuming that each of these borrow areas has a clean soil thickness of 4.5 ft, the combined available volume is about 69,000 cy, which is sufficient to meet expected needs. The Hillside source could be developed first to minimize haul distance, and the Clear Cut source could be developed only to the extent necessary.

5. GRAVEL

This pre-conceptual design assumes that gravel is placed on the 3H:1V side slopes of the consolidated stockpile to increase the erosion resistance. The required size will be determined during the detailed design process; based on previous experience, it is expected to be a few inches. The volume of gravel will depend in part on the percentage of suitably sized material already present in the clean-soil. For purposes of establishing an upper limit, a 3-inch-thick layer over the entire consolidated stockpile surface has been assumed.

Gravel will also be required for construction access roads, ditch linings, and other miscellaneous applications.

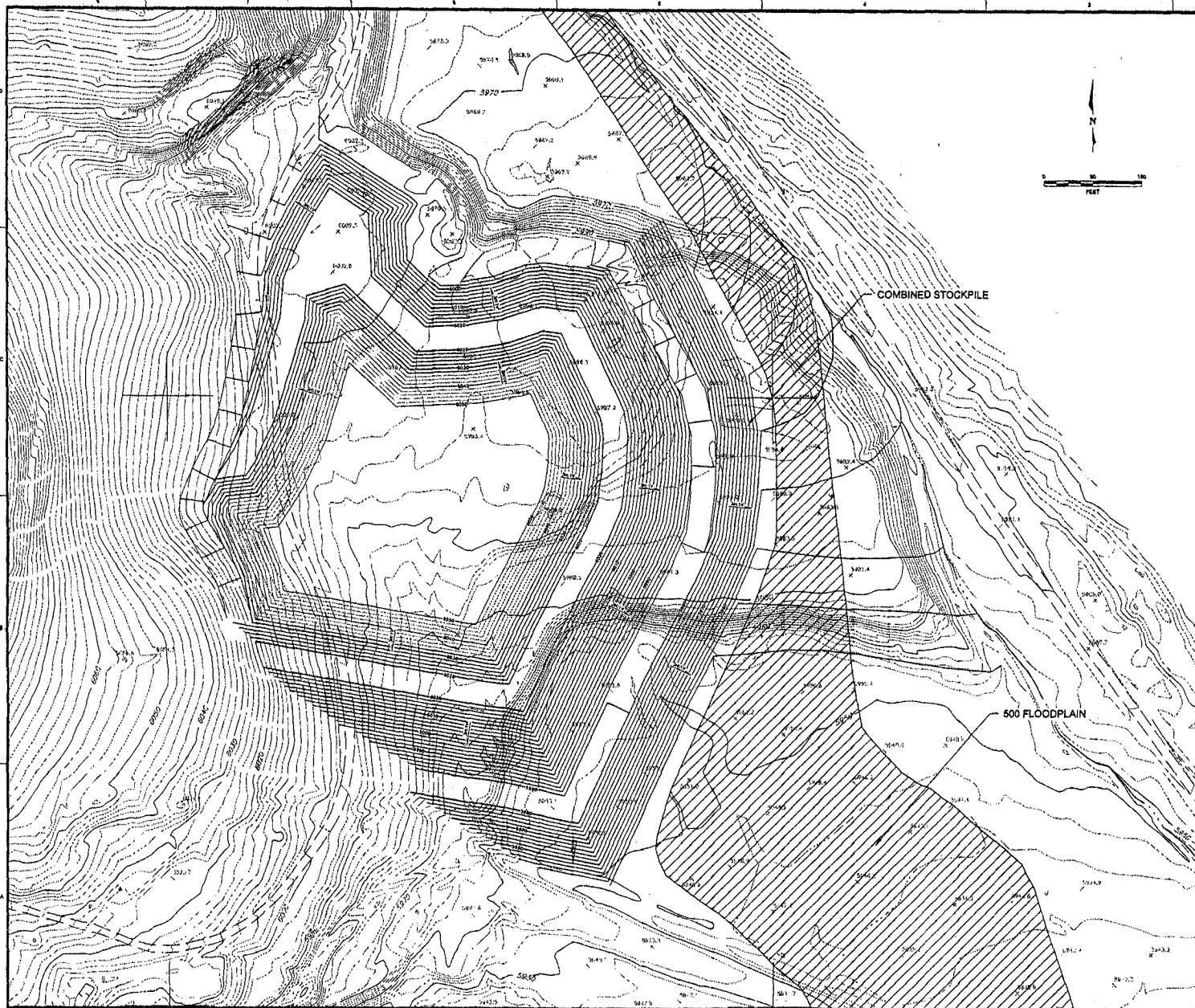
The preliminary estimate of total gravel needs is about 11,000 cy (including a 10% contingency).

A former gravel borrow area is located at the north end of the protore stockpile, as shown on Drawing 4. This area could be expanded to provide the gravel for remedial construction. Potential final contours of the expanded borrow area are shown on Drawing 4.

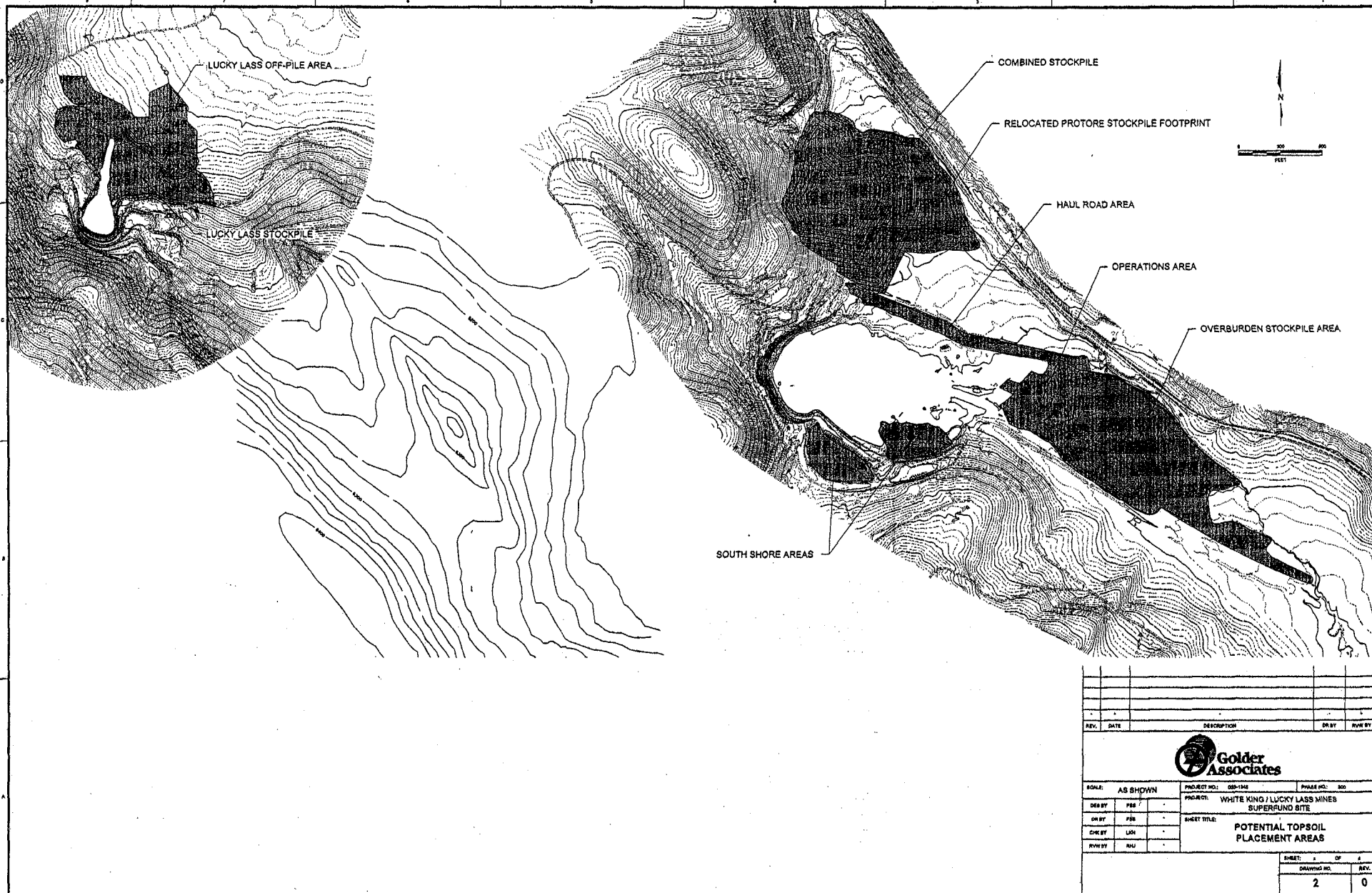
The design considerations for the gravel borrow area include the following:

- Based on visual observation of exposed cuts at the former gravel borrow area, the size distribution of soil and rock particles appears to be quite variable. Therefore, not all of the material excavated will be useable, and it is assumed that a screening plant will be used at the borrow area during construction. In addition, portions of the expanded gravel borrow area will have a topsoil layer of unknown thickness at the ground surface, which also will not be suitable for gravel. To account for these non-useable materials, the total volume of the expanded borrow area shown on Drawing 4 is about 40,000 cy, or slightly more than three times the actual required volume of gravel.
- Topsoil from this area can be used, and the fine screening fraction can probably be used for clean soil. However, because the quantities of these materials is so uncertain at this time, they have not been included in the estimates for the respective borrow sources.
- The final contours have been designed to provide a rounded, natural-appearing topography consistent with the adjacent landforms.
- The expansion is generally to the west so that the natural ridge and the consolidated stockpile will visually screen the borrow area from the main Augur Creek access road to the extent practical.


APPENDIX J DRAWINGS



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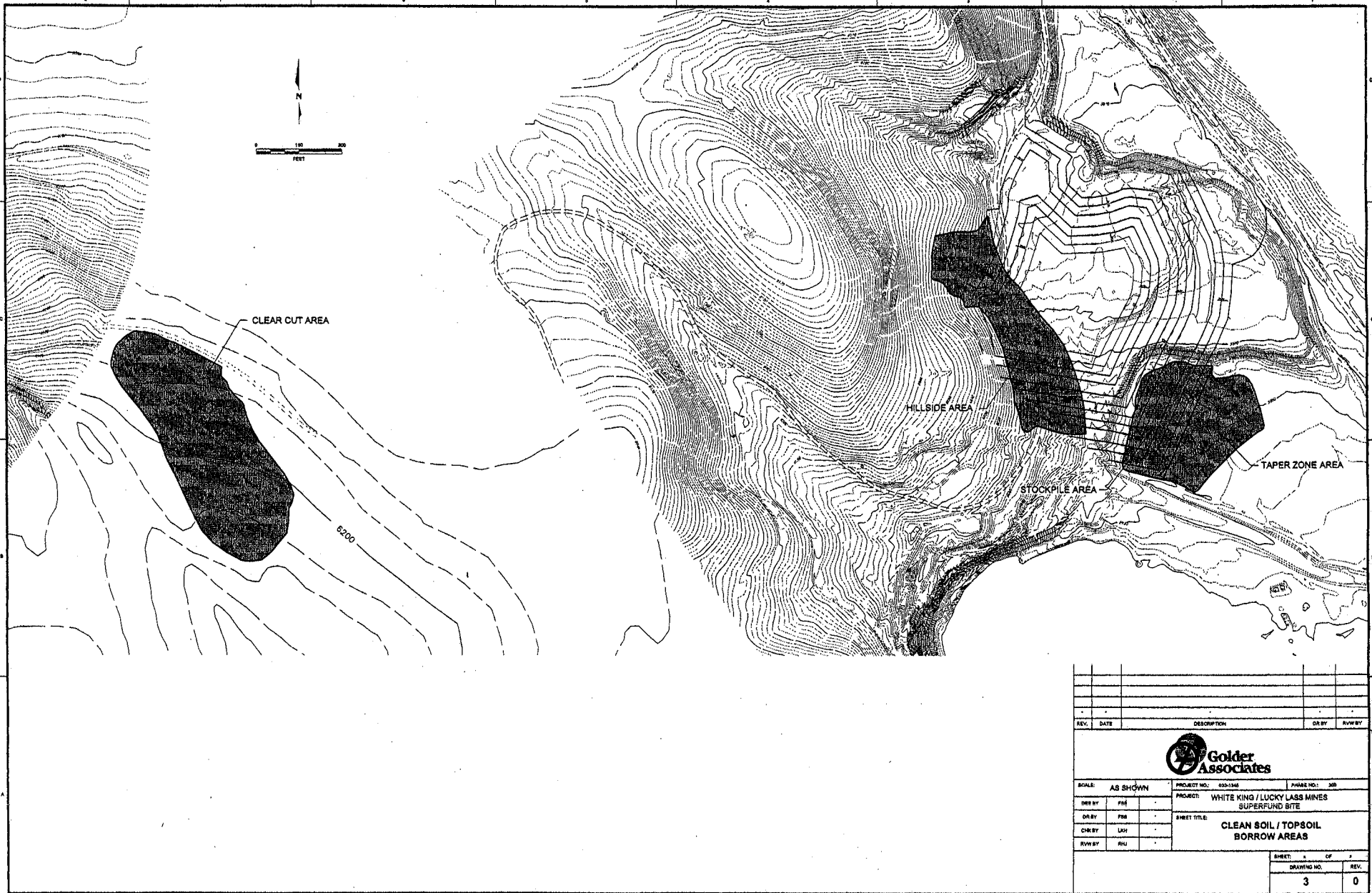


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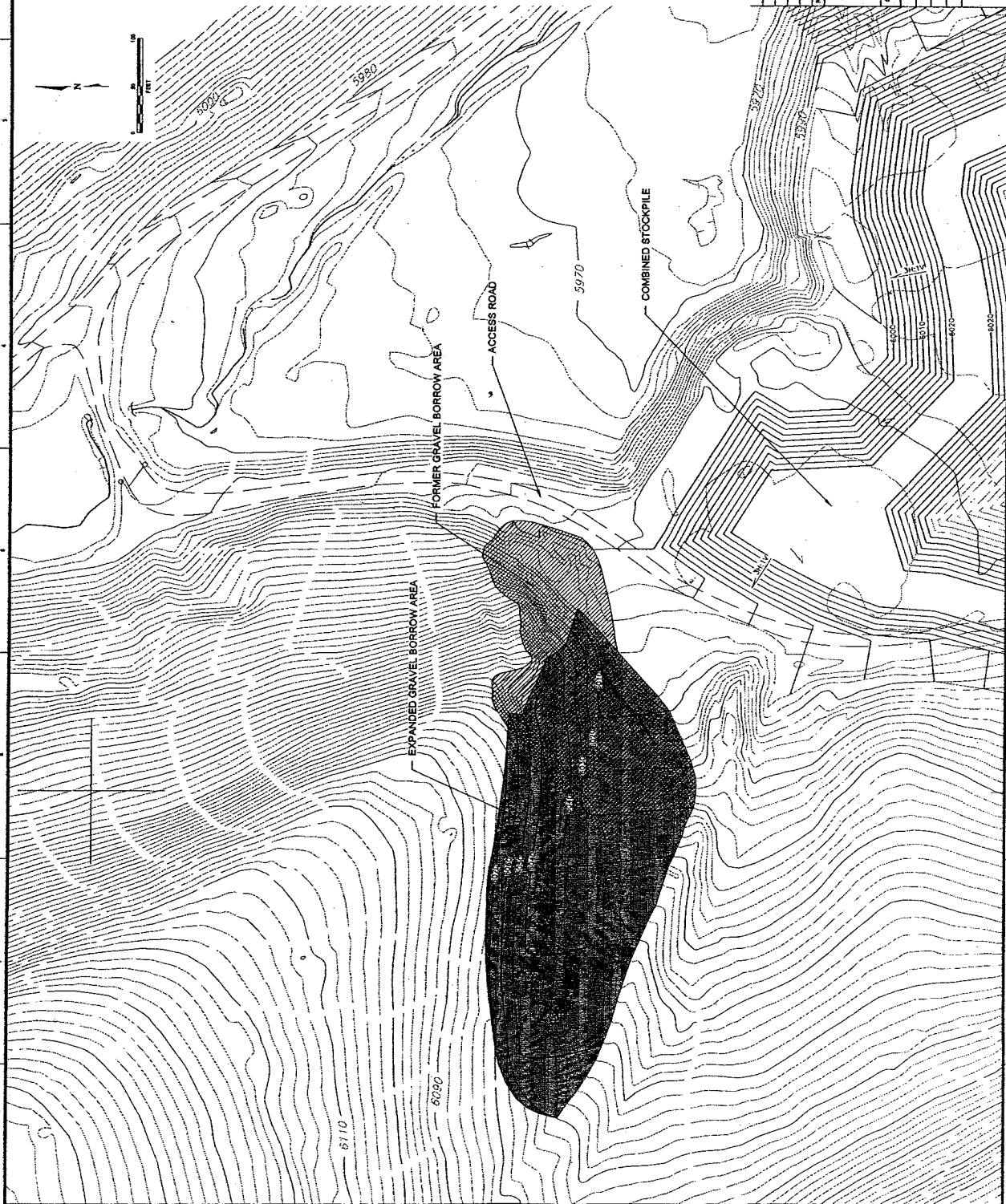
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